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10/586,352	07/17/2006	Mitsuru Maeda	00862.109538.	4143

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EXAMINER	
KIM, HEE-YONG	
ART UNIT	PAPER NUMBER
2482	
MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/586,352	MAEDA, MITSURU	
	Examiner	Art Unit	
	HEE-YONG KIM	2482	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 February 2011*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3,5-9,16 and 27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,5-8,16 and 27* is/are rejected.

7)☒ Claim(s) *9* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This office action is in reply to Applicant's Response dated February 4, 2011.

2. **Claims 2, 4, 10-15, 17-26, 28 and 29** have been cancelled.

3. **Claims 1, 3, 5-9, 16 and 27** have been amended.

4. **Claims 1, 3, 5-9, 16 and 27** are pending.

Response to Arguments

5. Rejection of Claims **24-28** under 35 U.S.C. 101 is withdrawn because of cancellation of claims 24-26 and 28, and amendment of claim 27.

6. Rejection of **Claim 6** under 35 U.S.C. 112, second paragraph is withdrawn because the amendment overcomes the previous rejection.

7. Applicant's arguments with respect to the prior art rejection over **claims 1, 3, 5-9, 16 and 27** have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. **Claims 1-2, 5, 16** and **27** are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang (Pattern Recognition Letters 24 (2003), pp.1523-1532) in view

of Ferman (IEEE Trans. Image Processing, vol. 11, No.5, pp.497-508) hereafter referenced as Zhang and Ferman.

Regarding **claim 1**, Zhang discloses Dynamic Selection and Effective Compression of Key Frames for Video Abstraction. Specifically Zhang discloses An encoding apparatus for encoding images of frames (motion compensated inter-coding, pp.1526, right col., line 1-2), which form a moving image by motion compensation, characterized by comprising:

input means for inputting images of frames (every video frame will be scanned, pp.1525, left col., last 3 lines);

section division means for dividing the frames into a plurality of sections (video shots, pp.1525, left col., last 12 lines) on the basis of the images of the frames input by said input means;

representative image setting means for setting as a representative image (select one representative frame for each cluster, pp.1525, right col., last 4 lines), an image of a self frame (key frame), from a group of images of other frames in each of the sections divided by said section division means; and

and wherein the image of the frame of interest is encoded by motion compensation (motion compensated inter-coding, pp.1526, right col., line 1-2) using the representative image selected by said reference image selection means. However, Zhang fails to disclose setting as a representative image, an image of a self frame, which has a smallest sum total value of differences from a group of images of other frames in each of the sections divided by said section division means; and wherein the image of the

frame of interest is encoded by motion compensation using **the images of the frames in the section that includes the representative image** selected by said reference image selection means.

Zhang discloses encoding key frames for the video summary based on reference to key frames. It was obvious to apply the same methodology to encoding whole video sequence using key frames as reference frames because key frames represents whole sequence up to the current picture, in order to improve coding efficiency. It was also obvious to extend the reference images to **the images of the frames in the section that includes the representative image** because each image in the same section is similar to the representative image but equally possible candidate for motion compensation, in order to improve coding efficiency by selecting the frame with the least motion compensation error.

Therefore, given this teaching, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Zhang by providing specifically encoding whole video in the same way as encoding key frames but motion compensation using the images of the frames in the section that includes the representative image, in order to improve coding efficiency. However Zhang still fails to disclose setting as a representative image, an image of a self frame, which has a smallest sum total value of differences from a group of images of other frames in each of the sections divided by said section division means.

In the analogous field of endeavor, Ferman discloses Robust Color Histogram Descriptor for Video Segment Retrieval and Identification. Ferman specifically discloses

representing a frame as a histogram (pp.499, left col., line 5-12) and *setting as a representative image, an image of a self frame, which has a smallest sum total value of differences from a group of images of other frames* (The histogram of the frame Minimizes Average Error (Total Error (difference) divided by the number of frames), is the optimum representative histogram for the given distance, pp. 500, left col., line 1-11), in order to select a key frame optimally representing a group of picture (pp.499, left col., line 5-12).

Therefore, given this teaching, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Zhang by providing specifically setting as a key frame, which has a smallest sum total value of differences from a group of images of other frames in each of the section, in order to select a key frame optimally representing a group of picture. The Zhang cluster based Key frame encoding, incorporating encoding whole video in the same way as encoding key frames but motion compensation using the images of the frames in the section that includes the representative image, further incorporating the Ferman setting as a key frame, which has a smallest sum total value of differences from a group of images of other frames in each of the section, has all the features of claim 1.

Regarding **claim 5**, Zhang teaches everything claimed as above (see claim 1). Zhang further teaches wherein that said reference image selection means calculates prediction errors of motion compensation with an image of a frame to be encoded for respective representative images set in the respective

sections, and selects the representative image that minimizes the prediction error (claim

1: in order to improve coding efficiency by selecting the frame with the least motion compensation error).

Regarding **claim 16**, the claim is a method claim corresponding to the apparatus claim 1. Therefore, it is rejected for the same reason as claim 1.

Regarding **claim 27**, the claim is a computer readable medium claim corresponding to the apparatus claim 16. Therefore, it is rejected for the same reason as claim 16.

10. **Claim 3** is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang in view of Ferman, further in view of Vasudevan (US 6,342,904), hereafter referenced as Vasudevan.

Regarding **claim 3**, Zhang and Ferman teach everything claimed as above (see claim 1). However, Zhang fails to disclose wherein that said section division means comprises difference determination means for determining with reference to images of frames in an order said input means inputs whether or not an image difference between neighboring frames is not less than a predetermined value, and

when said difference determination means refers to images in turn from an image of a first frame, and

determines that a difference between an image of a

second frame and an image of a third frame as a next

frame of the second frame is not less than the predetermined value, said difference determination means sets the first and second frames as one section.

In the analogous field of endeavor, Vasudevan discloses Creating a Slide Representation from Full Motion Video. Vasudevan specifically discloses wherein that said section division means comprises difference determination means for determining with reference to images of frames in an order said input means inputs whether or not an image difference between neighboring frames is not less than a predetermined value (When the difference between consecutive frames exceeds a predetermined threshold, a segment boundary is detected, col.7, line 11-13), and

when said difference determination means refers to images in turn from an image of a first frame, and determines that a difference between an image of a

second frame and an image of a third frame as a next

frame of the second frame is not less than the predetermined value, said difference determination means sets the first and second frames as one section (Examiner read as "first and second frames are in the one section and the third one in a new section", which is disclosed by Vasudevan as above), in order to detect a scene change (col.7, line 1-4).

Therefore, given this teaching, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Zhang and Ferman by providing specifically calculating the difference between consecutive frames and dividing video section when the difference exceeds the predetermined threshold, in order to detect a scene change with reduced computation. The Zhang cluster based Key frame encoding, incorporating encoding whole video in the same way as encoding key frames but motion compensation using the images of the frames in the section that includes the

representative image, further incorporating the Ferman setting as a key frame, which has a smallest sum total value of differences from a group of images of other frames in each of the section, further incorporating the Vasudevan calculating the difference between consecutive frames and dividing video section when the difference exceeds the predetermined threshold, has all the features of claim 3.

11. **Claim 4** is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang in view of Ferman, further in view of Adler (US 2005/0,028,213), hereafter referenced as Adler.

Regarding **claim 4**, Zhang and Ferman teach everything claimed as above (see claim 1). However, Zhang and Ferman fail to disclose wherein that said representative image setting means sets, as a representative image, an image of a self frame, which has a smallest sum total value of differences from a group of images of other frames in each of the sections divided by said section division means.

In the analogous field of endeavor, Adler discloses System and Method for User-Friendly Fast Forward and Backward Review of Video. Adler specifically teaches wherein that said representative image setting means sets, as a representative image, an image of a self frame, which has a smallest sum total value of differences from a group of images of other frames in each of the sections divided by said section division means (the frame that is closest to the centroid is chosen to be key frame for the cluster, paragraph 42), in order to get the optimized key frame.

Therefore, given this teaching, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Zhang and Ferman by providing specifically selecting the key frame in a section as the frame with the smallest sum total value of differences from a group of images of other frames in a section, in order to get the optimized key frame. The Zhang cluster based Key frame encoding, incorporating encoding whole video in the same way as encoding key frames but motion compensation using the images of the frames in the section that includes the representative image, further incorporating the Ferman setting as a key frame, which has a smallest sum total value of differences from a group of images of other frames in each of the section, further incorporating the Adler selecting the key frame in a section as the frame with the smallest sum total value of differences from a group of images of other frames in a section, in order to get the optimized key frame, has all the features of claim 4.

12. **Claim 6** is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang in view of Ferman, further in view of Vasudevan, and further in view of official notice.

Regarding **claim 6**, Zhang and Ferman and Vasudevan teach everything claimed as above (see claim 3). However, they fail to disclose wherein that the difference is a sum total value obtained by summing up differences between pixel values of corresponding pixels in two images for all or some pixels that form the images.

However, it was well known in the art that a frame difference is defined as a sum total value obtained by summing up the absolute differences (SAD) between pixel

values of corresponding pixels in two images for all that form the images.

13. **Claims 7-8** are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang in view of Ferman, further in view of Vasudevan, and further in view of Dufaux (US 6,782,049) (hereafter referenced as Dufaux).

Regarding **claim 7**, Zhang and Ferman teach everything claimed as above (see claim 1). However, they fail to disclose wherein that said section division means further comprises: determination means for determining whether or
not a frame of interest is included in a section to which a frame immediately before the frame of interest belongs ;
first setting means for, when the frame of interest is included in the section to which the frame immediately before the frame of interest belongs,
setting the representative frame set in the section or the frame of interest as a new representative image in the section on the basis of images of respective frames in the section and an image of the frame of interest;
and second setting means for, when the frame of
interest is not included in the section to which the frame immediately before the frame of interest belongs, setting a new section which is different from the
section and includes the frame of interest.

Vasudevan specifically discloses determination means for determining whether or not a frame of interest is included in a section to which a frame immediately before the frame of interest belongs ;first setting means for, when the frame of

interest is included in the section to which the frame immediately before the frame of interest belongs ; and second setting means for, when the frame of interest is not included in the section to which the frame immediately before the frame of interest belongs, setting a new section which is different from the section and includes the frame of interest. (When the difference between consecutive frames exceeds a predetermined threshold, a segment boundary is detected, col.7, line 11-13), in order to detect a scene change (col.7, line 1-4).

Therefore, given this teaching, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Zhang and Ferman by providing specifically calculating the difference between consecutive frames and dividing video section when the difference exceeds the predetermined threshold, in order to detect a scene change with reduced computation. However, Zhang and Ferman and Vasudevan still fail to disclose setting the representative frame set in the section or the frame of interest as a new representative image in the section on the basis of images of respective frames in the section and an image of the frame of interest.

In the analogous field of endeavor, Dufaux discloses System for Selecting a Keyframe to Represent a Video. Dufaux specifically discloses setting the representative frame set in the section or the frame of interest as a new representative image in the section on the basis of images of respective frames in the section and an image of the frame of interest (Fig.11 shows that a new keyframe is selected between existing keyframe and the current frame), in order to have an optimum keyframe dynamically based on the distance measure (Fig.11).

Therefore, given this teaching, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Zhang and Ferman and Vasudevan by providing specifically updating keyframe dynamically based on distance measure, in order to have an optimum keyframe. The Zhang cluster based Key frame encoding, incorporating encoding whole video in the same way as encoding key frames but motion compensation using the images of the frames in the section that includes the representative image, further incorporating the Ferman setting as a key frame, which has a smallest sum total value of differences from a group of images of other frames in each of the section, further incorporating the Vasudevan calculating the difference between consecutive frames and dividing video section when the difference exceeds the predetermined threshold, further incorporating the Dufaux updating keyframe dynamically based on distance measure, has all the features of claim 7.

Regarding **claim 8**, Zhang and Ferman and Vasudevan, and Dufaux, as applied to claim 7, teaches wherein that said determination means calculates a difference between an image of a last frame of the section to which the frame immediately before the frame of interest belongs, and the image of
the frame of interest, and when the calculated difference is not more than a predetermined threshold, said determination means determines that the frame of interest is included in the section to which the frame immediately before the frame of interest belongs (Vasudevan: When the difference between consecutive frames exceeds a predetermined threshold, a segment boundary is detected, col.7, line 11-13).

Allowable Subject Matter

14. **Claim 9** is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim 1 and an intervening claim 7.

Dependent **claim 9** recites "…first threshold setting means for, when the sum value is not less than the sum total value calculated by said first calculation means, setting the sum total value calculated by said first calculation means as the threshold; and second threshold means for, when the sum value is not more than the sum total value calculated by said first calculation means, setting the sum value as the threshold…" which are features that are not anticipated nor obvious over the art of record. Accordingly, if the claims are amended as indicated above, and if rejected claims 1-8, and 10-29 are cancelled, the application would be placed in a condition for allowance.

Conclusion

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to HEE-YONG KIM whose telephone number is (571)270-3669. The examiner can normally be reached on Monday-Thursday, 8:00am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marsha Banks-Harold can be reached on 571-272-7905. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/HEE-YONG KIM/
Examiner, Art Unit 2482

/Andy S. Rao/
Primary Examiner, Art Unit 2486
March 11, 2011